Space Weather Forecast

Issued on Saturday 12 October 2024 at 13:15 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Waning CME effects over the next 24 hours. Slight chance of G1/Minor Storm interval on Day 1 (12 Oct) and possibly late Day 2 (13 Oct). R1 Radio Blackouts are likely.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Activity has been Moderate, with the peak flare in the period a Moderate-class X-ray flare at 11/1633UTC from a large sunspot region in the southeast.

There are nine sunspot regions on the visible disc, three of which are currently unnumbered. The largest sunspot resides in the northwest, which continues to show some minor growth and complexity. A cluster of regions in the southwest appear to be mostly stable, with some minor decay. Finally, a couple sunspot regions in the southeast of the disc, continue to show some growth within their intermediate portions. Remaining spots are small and simple.

The aforementioned Moderate-class flare from the sunspot region in the southeast produced a Coronal Mass Ejection (CME) in coronagraph imagery at 11/1748 UTC, off the east limb. This has been analysed and results suggest a glancing blow at Earth on Day 4 (15 Oct), with the bulk of the CME missing ahead of Earth' orbit. This is currently low confidence due to missing imagery, therefore, further analysis is needed.

No other Earth-directed CMEs (Coronal Mass Ejections) have been observed over the past 24 hours.

Solar Wind / Geomagnetic Activity: This 24-hour continued to show waning influences from the Strong X-flare (09 Oct) Coronal Mass Ejection (CME), which arrived at Earth on the 10 Oct.

The solar wind speed started the period at very strong to strong levels, near 800 km/s, gradually declining to the current Elevated levels, near 580km/s. The magnetic field was moderate at the start of the period, gradually declining to weak levels. The north-south component was weakly negative, then became weak to moderate and mostly positive from around 11/1300 UTC.

The resulting geomagnetic activity showed a gradual decline from the CME influence, with a G2/Moderate Storm interval at the start of the period, declining to become mostly Active to Unsettled (Kp3-4) into the UTC day. Geomagnetic activity has recently declined to Quiet (Kp2).

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Energetic Particles / Solar Radiation: High energy proton flux has returned to near background levels.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate-class X-ray flares (Minor R1 radio blackouts) remain likely through this four-day period given sunspot developments on the Sun, their complexity, and perhaps two arrivals over the eastern solar horizon over the next 24 hours. The trend is level throughout - after an initial slightly higher risk from a very active region beyond the western limb.

Solar Wind / Geomagnetic Activity: The CME from the 09 October Strong-class X-ray flare and 'filament eruption' is continuing to affect Earth, but its intensity continues to wane.

A Moderate-class flare from a sunspot in the southeast disc produced a CME, which was seen in coronagraph imagery at 11/1748 UTC, off the east limb. This has been analysed and results suggest a glancing blow at Earth on Day 4 (15 Oct), with the bulk of the plasma ahead of Earth' orbit. This is currently low confidence due to missing imagery, therefore, further analysis is needed.

A pair of potential coronal hole fast winds may affect the Earth late Day 2 (13 Oct), although confidence in any effects from these features is Low.

Geomagnetic activity is expected to gradually wane to predominately Quiet to Active conditions (Kp2-4), with a slight chance of G1/Minor Storm should either of the CH fast winds connect at Earth. A further enhancement is possible by Day 4 (15 Oct) due to a glancing blow from a CME, which left the Sun on 11 Oct, although this is Low confidence.

Energetic Particles / Solar Radiation: Further risk of S1/Minor storms until Day 2 (13 Oct) due to the presence of an Ex-sunspot region just beyond the west limb. This accounts for the initial slightly raised levels in the near-Earth environment (making any further enhancements more liable to tip above S1) and the presence of the large active region over the western solar horizon. Eastern arrivals do not feature (being too far from a prone location).

Geomagnetic Storms

Geomagnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	**G1 to G2**	Yes	10	10	5	10
Strong	**G3**	No	1	1	1	0
Severe	**G4**	No	1	1	1	0
Extreme	**G5**	No	1	1	1	0

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Radio Blackouts - X-Ray Flares

X-Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 (M Class)	Yes	65	60	60	60
Very Active	R3-R5 (X Class)	No	15	10	10	10

Solar Radiation Storms (High Energy Protons)

Radiation Storms	Level ($cm^{-2}sr^{-1}s^{-1}$)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	25	20	15	10
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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